BUILDING FOR THE FUTURE

CONSTRUCTION ECONOMICS
Market Conditions in Construction
CONSTRUCTION GROWTH LOOKING UP:

Construction spending for 2014 is expected to finish the year 5.4% higher than 2013. All sectors will contribute to the growth. See Table 2, Page 15.

Cash flow of new starts for nonresidential buildings indicates a 15% increase in the monthly rate of spending over the next 10 months. See Figure 4, Page 12.

A correlation between the Architectural Billings Index (ABI), Dodge Momentum Index (DMI) and new starts cash flows has twice predicted the direction of nonresidential buildings spending over the last two years. Current forward look shows a flat period in Q4 2014 then a rapid rise in 2015. See Figure B, Page 6; Figure 3, Page 11; and Figure 4, Page 12.

The U.S. gained 290,000 construction jobs over the last 12 months. Construction jobs are up 13% from the low point. Jobs plus hours worked show that total labor effort is up 18% from its lowpoint. More than forty percent of the total increased labor effort in the last four years is due to added hours.

FIGURE A:

All Construction Spending Rate of Growth 2013-2015

Total spending of ALL types of construction will grow 5.4% year over year from 2013 to 2014. We started 2014 at an annual rate of spending near $950 billion and finished at a rate of $990 billion.

As expected, nonresidential buildings contributed to the dips in March and June in 2014, but helped lead the expansion for the second half of 2014.
SOME ECONOMIC FACTORS ARE STILL NEGATIVE:

• Real inflation adjusted constant construction volume is still 22% below peak and has not yet returned to the level of volume in 1993. At the historical rate of volume growth, it will take seven to eight more years to regain previous peak volume levels.

• Currently there are 6.1 million jobs and the total workforce is near 6.7 million, still near a 15-year low, about 1.5 million (18%) lower than the 2006-2007 peak. Since January 2010, between 400,000 and 700,000 workers have left the workforce.

• As workload expands in the next few years, a shortage of available skilled workers will continue to drive up labor cost and have a detrimental effect on schedule.

• In a recent Associated General Contractors (AGC) survey of contractors, 80% indicated some difficulty in acquiring trained workers.

THE EFFECTS OF GROWTH:

• Contractors gain more ability to pass along costs and increase margins as spending continues to increase. Selling price indices for 2013 and 2014 show contractors’ as built price both years is above labor and material cost inflation. Margins are increasing.

• Since the low point in January 2011, spending has increased 25%. Construction labor effort has increased by 18%. However, spending corrected for inflation shows construction volume has increased by only 10%. Productivity is declining.

• Growth in nonresidential buildings and residential construction in 2014 and 2015 will lead to more significant labor demand. This may lead to labor shortages and productivity losses.

• Margins regained a positive footing in 2012 and extended those gains in 2013. Margins increased in 2014 and margins are expected to grow even stronger in 2015.

• When activity picks up in all sectors, escalation will begin to advance rapidly.

“

In 2014, the U.S. showed a productive increase of 290,000 construction jobs!

“
The most favorable forward-looking conditions I’ve seen in years support my expectations for strong growth and profits in 2015. Very active markets will drive escalation to climb more rapidly than we have seen in six years.

**IMPACT OF RECENT EVENTS:**

There are several reasons why spending is not rapidly increasing:

- public sector construction remains depressed
- public educational spending is the single largest contributor to the drop in public spending
- lenders are just beginning to loosen lending criteria for project financing but are not providing equal terms to lend working capital to subcontractors
- consumers are still cautious about increasing debt load, including the consumers’ share of public debt
- we may be constrained by a skilled labor shortage

**FIGURE B:**

Architectural Billings Index 2012-2014

**FIGURE C:**

Inflation / Escalation 2011-2016

In order to capture increasing margins, future escalation will be higher than normal labor and material cost growth. Lagging regions will take longer to experience high escalation. Residential escalation is currently near, or even above, the upper end of the range. For escalation back to year 2000, see Figure 25, Page 71.

We advise a range of

- 3.5% to 6.5% for 2014
- 4.5% to 8% for 2015
- 5.0% to 8% for 2016
Construction Starts

Construction Starts data is published monthly by McGraw Hill Construction (MHC). Each month, they update the data for the previous month and for the data 12 months prior. We incorporate the previous month and year prior update to data into our charts and tables. Although MHC may publish further updates to its data, we do not track any data beyond the 12 month update. This may result in values here that differ slightly from other published MHC data.

Construction Starts data is volatile from month to month and this may cause unusual peaks and valleys in the data. For that reason, we use a three-month moving average (3mma) of starts data. To observe trends in the data, we compare the latest month to the last three months and the last six months of the Seasonally Adjusted Annual Rate (SAAR) data.

Residential (Res) starts prior to Q2 2013 showed consistent slow growth for three years, but then had no growth until Q3 2014. Expect 2015 growth to resume at a slower rate.

Nonresidential buildings (Nonres) starts hit a 12-month low in February 2014 but reached a six-year high in the last three months. Expect growth to moderate over the next three to six months.

Nonbuilding (Nonbldg) starts have been declining since a 2012 peak. The Jan-Jun six-month average is the lowest going back to Jan 2008. Starts recovered in Sept. Oct. and Nov. Expect very little growth in 2015.

FIGURE 1: Construction Starts Trends 2013-2014

Residential (Res) starts prior to Q2 2013 showed consistent slow growth for three years, but then had no growth until Q3 2014. Expect 2015 growth to resume at a slower rate.

Nonresidential buildings (Nonres) starts hit a 12-month low in February 2014 but reached a six-year high in the last three months. Expect growth to moderate over the next three to six months.

Nonbuilding (Nonbldg) starts have been declining since a 2012 peak. The Jan-Jun six-month average is the lowest going back to Jan 2008. Starts recovered in Sept. Oct. and Nov. Expect very little growth in 2015.
EXPECTATIONS FOR 2014 NEW CONSTRUCTION STARTS:

- We predicted total growth in new starts of 6.3% for 2014. This latest report compared to the prior shows a 6% increase each in nonresidential buildings and non-building infrastructure, but a 1% decline in new residential starts.

- Nonresidential buildings starts in February dropped to a 12-month low. However, for the April through November period, starts reached the best three-month average and best six-month average since July 2008, both more than a six-year high. Our prediction of nonresidential building starts has increased twice since the start of 2014.

- Residential starts grew from $120 billion to $200 billion, or 67%, from Q1 2011 to Q1 2013. Residential starts have been just above $200 billion for 21 of the last 22 months. But for the 12 months from July 2013 through June 2014, growth stalled. For the first six months of 2014, there was no growth at all from the previous six months. Residential starts have been increasing slowly since July 2014.

- Nonbuilding infrastructure starts reached a 16-month high in December 2013, but the average of the first six months of 2014 is the lowest on record back to January 2008. Finally, the last three months improved and is the best in a year. Expect a 8% decline in infrastructure starts in 2014 compared to 2013. Expect an 8% decline in infrastructure starts in 2014 compared with 2013.

### TABLE 1:

**U.S. Construction Market Outlook New Starts 2009-2015**

<table>
<thead>
<tr>
<th>Total Construction Starts</th>
<th>MHC Forecast</th>
<th>Gilbane Forecast</th>
<th>Gilbane Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresidential Buildings</td>
<td>167,955</td>
<td>161,194</td>
<td>165,048</td>
</tr>
<tr>
<td></td>
<td>-4.0%</td>
<td>2.4%</td>
<td>-4.1%</td>
</tr>
<tr>
<td>Residential Buildings</td>
<td>111,851</td>
<td>121,155</td>
<td>126,299</td>
</tr>
<tr>
<td></td>
<td>8.3%</td>
<td>4.2%</td>
<td>31.6%</td>
</tr>
<tr>
<td>Nonbuilding Construction</td>
<td>141,899</td>
<td>148,088</td>
<td>147,851</td>
</tr>
<tr>
<td></td>
<td>4.4%</td>
<td>-0.2%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Total Construction</td>
<td>421,705</td>
<td>439,437</td>
<td>439,198</td>
</tr>
<tr>
<td>percent change yr. after yr.</td>
<td>2.1%</td>
<td>2.0%</td>
<td>10.9%</td>
</tr>
</tbody>
</table>

dollars in millions
includes McGraw Hill data for November 2014 released December 18, 2014
MHC Data includes updates to 12 months ago data through November 2013
all data after November 2014 is predicted
FIGURES 2 A, B, C:

Note: All MHC Starts seasonally adjusted (SAAR) data is revised one month later and not seasonally adjusted (NSA) data is revised 12 months later. These plots include both 12-month and one-month adjustments. The vertical lines show the revision month.

FIGURE 2A: Construction Starts Nonresidential Buildings 2011-2014

FIGURE 2B: Construction Starts Nonbuilding Infrastructure 2011-2014

FIGURE 2C: Construction Starts Residential Buildings 2011-2014
NEW CONSTRUCTION STARTS AS A LEADING INDICATOR:

MHC Construction Starts can act as a leading indicator to spending. Even though not all construction projects are captured in the starts data (only about 50% is captured), we have more than enough data to develop cash flows over time that will show the expected direction in construction spending activity. Starting with the three-month moving average of actual starts, a cash flow spreads out the value of the new project starts over the expected project duration from start to finish. Generally, project durations can range from six to nine months for small projects and up to 24 to 36 months for very large projects. Project duration and cash flow begins in the month the data is posted. The cumulative cash flow total in the current month from all monthly starts over the last two years shows the relative change in spending caused by fluctuation in starts.

FIGURE 3:
Construction Starts – Cumulative Cash Flow of Starts 2012-2015

The cash flow plot in Figure 3 shows the slowdown that occurred in residential spending over the last few quarters. A decline in nonbuilding infrastructure projects is very clear. For nonresidential buildings work, we saw rapid growth through most of 2014 with a flat period in Q4 2014 before rapid growth resumes in Q1 2015.
The following index chart shows the correlation among nonresidential starts cash flow, the Architectural Billings Index (ABI), the Dodge Momentum Index (DMI) and actual Construction Spending. Starts data is from the aggregate cash flow explained on Page 11. ABI and DMI data are moved out to their respective lead times; date and spending is real time. The ABI indicates growth if above 50 and a decline if it drops below 50. The Commercial (Comm) and Institutional (Inst) components of the ABI are shown for reference. Although there may be a one to three month differential, there appears to be a correlation between the ABI and Starts, and they provide an indication of the strength and the direction that spending will move.

*Both ABI and Starts cash flows indicate a mild slowdown in nonresidential buildings construction spending at the end of 2014 before a strong upturn in spending in 2015. Expect another drop in spending late in 2015.*
Construction Spending
Construction Spending

Total spending for ALL types of construction in 2014 will reach 5.4% year over year from 2013 spending.

- In Q1 2013, the monthly rate of spending was $870 billion.
- In Q1 2014, the monthly rate of spending averaged $950 billion.
- In Q4 2014, the monthly rate of spending will reached $960 billion.

For 2014 year-to-date, nonresidential infrastructure spending is down 5% from the beginning of the year, and nonresidential buildings spending declined from December to March then rebounded very strongly. For eight months, residential buildings spending has been range bound lower than the second half of 2013.

For the remainder of 2014, nonresidential buildings and residential contributed equally to growth while nonbuilding infrastructure remained flat.
### TABLE 2:

**Total Construction Spending Summary 2007-2015**

<table>
<thead>
<tr>
<th>U.S. Total Construction Spending Summary</th>
<th>Actual</th>
<th>Gilbane Forecast</th>
<th>Gilbane Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresidential Bldgs</td>
<td>403.9</td>
<td>438.6</td>
<td>377.5</td>
</tr>
<tr>
<td>% change year over year</td>
<td>18.9%</td>
<td>8.6%</td>
<td>-13.9%</td>
</tr>
<tr>
<td>Nonbuilding Hvy Engr</td>
<td>248.1</td>
<td>272.1</td>
<td>273.5</td>
</tr>
<tr>
<td>% change year over year</td>
<td>19.4%</td>
<td>9.7%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Residential</td>
<td>500.5</td>
<td>357.7</td>
<td>253.9</td>
</tr>
<tr>
<td>% change year over year</td>
<td>-19.3%</td>
<td>-28.5%</td>
<td>-29.0%</td>
</tr>
<tr>
<td>Total</td>
<td>1152.5</td>
<td>1068.4</td>
<td>904.9</td>
</tr>
<tr>
<td>% change year over year</td>
<td>-1.3%</td>
<td>-7.3%</td>
<td>-15.3%</td>
</tr>
</tbody>
</table>

Residential includes new, remodeling, renovation and replacement work.

Source: U.S. Census Bureau, Department of Commerce.

Actual spending data through June 2014 revised back to 2008.

A comparison of most recent projections is shown in Table 3 below. Gilbane projections are compared to CMD Construction Data (CMD) and FMI.

CMD Forecast  | FMI Forecast

### TABLE 3:

**Total Spending Predictions Comparisons 2014-2015**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>data updated 1-6-15</td>
<td>Gilbane</td>
<td>CMD</td>
<td>FMI</td>
<td>Gilbane</td>
<td>CMD</td>
<td>FMI</td>
</tr>
<tr>
<td>Residential</td>
<td>357</td>
<td>365</td>
<td>379</td>
<td>405</td>
<td>413</td>
<td>419</td>
</tr>
<tr>
<td>Nonresidential</td>
<td>319</td>
<td>317</td>
<td>310</td>
<td>364</td>
<td>342</td>
<td>327</td>
</tr>
<tr>
<td>Nonbuilding</td>
<td>284</td>
<td>291</td>
<td>282</td>
<td>271</td>
<td>313</td>
<td>295</td>
</tr>
<tr>
<td>TOTAL Nonres</td>
<td>603</td>
<td>608</td>
<td>592</td>
<td>634</td>
<td>655</td>
<td>622</td>
</tr>
<tr>
<td>TOTAL ALL</td>
<td>960</td>
<td>973</td>
<td>971</td>
<td>1039</td>
<td>1068</td>
<td>1041</td>
</tr>
</tbody>
</table>

Values are billions of dollars.

Gilbane data 2014 and 2015 – December 2014 report
CMD data 2014 and 2015 = 12-05-2014 report
FMI data 2014 and 2015 – 3rd Quarter Outlook report
FMI Transportation and Communication moved from Buildings to Nonbuilding.
NONRESIDENTIAL CONSTRUCTION SPENDING

Total spending for all nonresidential construction in 2014 will reach $603 billion, up 6.1% year over year from 2013.

Nonresidential construction consists of two main categories:
1. Nonbuilding infrastructure projects
2. Nonresidential buildings

Nonbuilding Infrastructure Spending

Nonbuilding projects are composed of heavy engineering, heavy industrial and infrastructure projects. They include transportation, communication, power, highway and street, sewage and waste disposal, water supply and conservation and development. Almost 60% of non-building work is public work.

Total spending for nonbuilding infrastructure in 2014 will reach $284 billion, a 5.4% increase from 2013.

• In Q1 2013, the monthly rate of spending was $256 billion.
• In Q1 2014, the monthly rate of spending increased to an average $292 billion.
• In Q3 2014, the monthly rate of spending dropped to $278 billion.
• For 2015, I expect the decline to continue.

The largest components of nonbuilding infrastructure work are power and highway/street. Erratic movement in new starts in the power industry causes unusual fluctuations in nonbuilding infrastructure spending. A 55% decline in new power starts in 2013 may cause fluctuations in spending for the next two years. The period from July 2012 through August 2013 had the lowest average new starts for infrastructure work of any period in the last six years, until the first six months of 2014 went even lower. The effect of all of those declines in new starts will result in constrained spending continuing through 2015.

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**FIGURE 6:**

Nonresidential Buildings and Infrastructure Spending Growth 2013-2015

$ annualized by historical monthly avg
Nonresidential Buildings Spending

The ABI marked a decline in design work up to April 2013 that is reflected in lower new nonresidential buildings starts and spending that bottomed at a nine-month low in March. Both the ABI and new starts cash flows indicate nonresidential buildings spending will slow slightly in the next few months before resuming rapid growth through Q3 2015.

**Total spending for nonresidential buildings construction in 2014 reached $318 billion, a 5.4% increase from 2013.**

- In Q1 2013, the monthly rate of spending was $294 billion.
- In Q1 2014, the monthly rate of spending was $301 billion.
- In Q4 2014, the monthly rate of spending increased to $335 billion.
- By Q3 2015, the monthly rate of spending may reach $375 billion.

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**Spending Predictions Comparisons – Nonresidential Buildings 2014**

<table>
<thead>
<tr>
<th>2014 Spending Prediction Comparisons - Nonresidential Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Early Estimate</strong></td>
</tr>
<tr>
<td><strong>data updated 12-10-14</strong></td>
</tr>
<tr>
<td>Gilbane Building Company</td>
</tr>
<tr>
<td>CMD Construction Data</td>
</tr>
<tr>
<td>FMI</td>
</tr>
<tr>
<td>Associated Builders &amp; Contractors</td>
</tr>
<tr>
<td>McGraw Hill Construction</td>
</tr>
<tr>
<td>IHS Global Insight</td>
</tr>
<tr>
<td>Moody’s Economy.com</td>
</tr>
<tr>
<td>Wells Fargo</td>
</tr>
</tbody>
</table>

Values are billions of dollars

Gilbane data 1= Apr’14 report 2=Aug’14 report 3=Dec’14 report
CMD data 4=Feb’14 report 5=Jul’14 report 6=Dec’14 report
FMI data 7= Mar’14 1st Qtr Outlook 8=Jun’14 2nd Qtr Outlook 9=3rd Qtr Outlook
ABC data 10= December Forecast 12-09-14 extrapolated
10 = AIA Jan 2014 Consensus report
11 = AIA July 2014 mid-year Consensus report

The major institutional sectors, healthcare and education, represent 23% of all nonresidential construction and ±40% of nonresidential buildings spending. Both peaked in 2008, with education at an annual rate of $105 billion and healthcare at $47 billion. Education is 80% public while healthcare is 80% private.
Commercial and office sectors represent 15% of all nonresidential construction and ±30% of nonresidential buildings spending. Commercial peaked in 2007, while office peaked in 2008. Both declined 50% from their peaks. Commercial is 95% private and office is 70% private.

The manufacturing sector represents 10% of all nonresidential construction and ±17% of nonresidential buildings spending. Manufacturing peaked in early 2009 but dropped 50% to hit a five-year low in Jan 2011. I predict spending on new manufacturing buildings will reach a new high in 2015. Manufacturing is 100% private.

These five market sectors represent 84% of all nonresidential buildings spending. See Table 5.

**TABLE 5:**

**Construction Spending Major Nonresidential Markets 2007-2015**

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>Gilbane Forecast</th>
<th>Gilbane Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>96.8</td>
<td>104.9</td>
<td>103.2</td>
</tr>
<tr>
<td>% change year over year</td>
<td>14.0%</td>
<td>8.4%</td>
<td>-1.6%</td>
</tr>
<tr>
<td>Healthcare</td>
<td>43.8</td>
<td>48.9</td>
<td>44.8</td>
</tr>
<tr>
<td></td>
<td>13.8%</td>
<td>7.3%</td>
<td>-4.4%</td>
</tr>
<tr>
<td>Commercial retail</td>
<td>89.7</td>
<td>86.2</td>
<td>54.7</td>
</tr>
<tr>
<td></td>
<td>16.9%</td>
<td>-3.9%</td>
<td>-36.5%</td>
</tr>
<tr>
<td>Office</td>
<td>65.3</td>
<td>68.6</td>
<td>33.9</td>
</tr>
<tr>
<td></td>
<td>20.4%</td>
<td>5.1%</td>
<td>-24.3%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>40.6</td>
<td>54.1</td>
<td>37.9</td>
</tr>
<tr>
<td></td>
<td>24.4%</td>
<td>33.2%</td>
<td>7.6%</td>
</tr>
<tr>
<td>Total</td>
<td>336.2</td>
<td>360.7</td>
<td>312.8</td>
</tr>
<tr>
<td></td>
<td>32.2%</td>
<td>7.3%</td>
<td>-13.3%</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, Department of Commerce
includes public and private
Actual Spending data through June 2014 revised back to 2008

Total spending for Educational buildings in 2014 reached $78.7 billion, a 0.9% increase from 2013. This is the first time since 2008 that spending for Educational buildings has not declined. I expect 2015 spending to increase 6%.

Public educational projects are funded by tax dollars. Therefore, we may expect a delayed rebound in public educational spending due to future economic reactions. Since Q1 2009, public educational spending has declined 30% from $90 billion to $62 billion. Private educational spending has declined 11% from $19 billion to $17 billion. In the last two years, private educational spending declined 3% but public spending has returned to positive.
Total spending for Healthcare buildings in 2014 reached only $38.8 billion, a 6.5% decline from 2013. I expect 2015 spending to increase 8%.

Total spending for Commercial buildings in 2014 reached $56 billion, up 10% from 2013. I expect 2015 spending to increase 12%.

Total spending for Office buildings in 2014 reached $44 billion, up 17% from 2013. This is the first substantial increase in spending for office buildings since 2007. I expect 2015 spending to increase another 15%.

Total spending for Manufacturing buildings in 2014 reached $54 billion, up 13.7% from 2013. I expect 2015 spending to increase 14%.

---

**TABLE 6: Spending Predictions Comparisons – Major Nonresidential Markets 2014-2015**

<table>
<thead>
<tr>
<th></th>
<th>2014 - 2015 Spending Prediction Comparisons</th>
<th>Selected Nonresidential Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Growth Change 2014 versus 2013</strong></td>
<td>Education</td>
<td>Healthcare</td>
</tr>
<tr>
<td>Gilbane</td>
<td>0.9%</td>
<td>-6.5%</td>
</tr>
<tr>
<td>CMD Construction Data</td>
<td>0.2%</td>
<td>-7.1%</td>
</tr>
<tr>
<td>FMI</td>
<td>0.0%</td>
<td>-1.7%</td>
</tr>
<tr>
<td>ABC</td>
<td>-1.0%</td>
<td>-6.7%</td>
</tr>
<tr>
<td>McGraw Hill Construction</td>
<td>-1.9%</td>
<td>-4.6%</td>
</tr>
</tbody>
</table>

| **Growth Change 2015 versus 2014** | Education | Healthcare | Commercial | Office | Manufacturing |
| Gilbane          | 6.0%  | 8.0%  | 12.0% | 15.0% | 14.0% |
| CMD Construction Data | 5.0%  | 6.5%  | 9.0%  | 8.5%  | 10.5% |
| FMI              | 2.9%  | 3.6%  | 5.0%  | 7.0%  | 7.8%  |
| ABC              | -0.3% | 2.2%  | 10.1% | 15.7% | 12.9% |
| McGraw Hill Construction | 4.8%  | 4.1%  | 15.3% | 21.8% | 10.4% |

*Gilbane data 2014 and 2015 - December 2014 report*
*CMD data 2014 and 2015 = 12-05-2014 report*
*FMI data 2014 and 2015 - 3rd Quarter Outlook report*
*ABC data 2014 and 2015 - December Forecast 12-09-14*
**TOTAL CONSTRUCTION SPENDING**

*Total spending for public construction in 2014 reached $272 billion, an increase of only 0.9% from 2013. This ends a four-year decline in public spending.*

The largest public construction markets are highway and education. Those two markets alone represent more than half of all public construction, followed by transportation, a distant third, and waste disposal fourth. Together, those four markets account for nearly 75% of all public construction, and they are all up year-to-date.

Private spending volume is almost two and a half times that of public spending. If we take out residential construction, private spending would be only 25% greater than public spending.

Private construction is predominantly residential. Ninety-six percent of all residential work is private and constitutes just over half of all private work. (A historical note: in 2005-2006, residential work constituted 70% of all private work and more than half of all construction spending). Power (15%), commercial (8%), manufacturing (7%) and office (5%) make up the next largest private building sectors.

Private construction is predominantly residential. 96% of all residential work is private and constitutes just over half of all private work. (A historical note: in 2005-2006, residential work constituted 70% of all private work and more than half of all construction spending). Power (15%), commercial (8%), manufacturing (7%) and office (5%) make up the next largest private building sectors.

*Total spending for Private construction in 2014 reached $687 billion, an increase of 7.2% from 2013, although still 25% below the peak of $912 billion in 2006.*

The growth in private spending for the last two years has been driven by residential, up 13% in 2012 and 19% in 2013. In 2014, we started to see a shift in that nonresidential building was picking up pace and residential was slowing. By 2016, they will contribute almost equally to growth in private spending.

---

**TABLE 7:**

**Total Construction Spending Public vs. Private 2007-2015**

<table>
<thead>
<tr>
<th>U.S. Total Construction Spending</th>
<th>Actual</th>
<th>Gilbane Forecast</th>
<th>Gilbane Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Private</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% change year over year</td>
<td>-5.3%</td>
<td>-12.0%</td>
<td>-22.3%</td>
</tr>
<tr>
<td>Private Residential</td>
<td>403.2</td>
<td>339.3</td>
<td>245.9</td>
</tr>
<tr>
<td>Private Nonresidential</td>
<td>370.2</td>
<td>409.4</td>
<td>344.1</td>
</tr>
<tr>
<td>Public</td>
<td>288.9</td>
<td>308.7</td>
<td>314.9</td>
</tr>
<tr>
<td>% change year over year</td>
<td>13.1%</td>
<td>6.9%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Total</td>
<td>1132.3</td>
<td>1088.4</td>
<td>904.4</td>
</tr>
<tr>
<td>% change year over year</td>
<td>-1.3%</td>
<td>-7.3%</td>
<td>-15.3%</td>
</tr>
</tbody>
</table>

*Source: U.S. Census Bureau, Department of Commerce
Includes public and private
Actual Spending data through June 2014 revised back to 2008*
RESIDENTIAL CONSTRUCTION SPENDING

Total spending for residential construction in 2014 reached $358 billion, a 4.7% increase from 2013.

- In Q1 2012, the monthly rate of spending was $252 billion.
- By Q1 2013, the monthly rate of spending climbed to $318 billion, up 26% year over year.
- In Q1 2014, the monthly rate of spending was $359 billion, up only 13% from Q1 2013.
- From Q2 and Q3 2014, the monthly rate of spending slowed to $353 billion.
- By Q4 and for 2015, I expect the monthly rate of spending will reach $424 billion.

The rate of growth in residential spending has been slowing since Q4 2013. From Dec 2013 to Oct 2014, there has been no growth. The next few months show a promise for return to growth. The average spending rate will grow less than 2% from Q4 2013 to Q4 2014, but should grow 15% from Q4 2014 to Q4 2015.

---

FIGURE 7:
Residential Buildings Spending Rate of Growth 2013-2015

![Residential Buildings Spending Rate of Growth 2013-2015](chart.png)
In January 2014, I predicted 1,050,000 new housing starts for 2014. That estimate at the time was only in the 20th percentile of all estimates. All estimates have been repeatedly revised lower several times this year.

In January, there were 14 estimates available for new housing starts in 2014 ranging from 1,045,000 to 1,390,000. Only six estimates were 1,100,000 or lower. The 1,390,000 outlier estimate was so unrealistic that it should have been thrown out. The average of all the others was 1,110,000 or expected growth of 185,000 new units over 2013. We have never before in history achieved such a high growth rate.

We actually started 610,000 new residential units in 2011, 780,000 new units in 2012 and 925,000 new units in 2013. The fastest rate of growth for new housing starts was from 1991 to 2005 with 170,000 additional new units in 1994. In the boom years from 2002 to 2005, growth only increased about 100,000 new units per year. We duplicated the fastest annual growth of 170,000 new units in 2012. Growth in 2013 added 145,000 new units over 2012.

For nine quarters through mid-2013, permits growth averaged over 6% per quarter. For the last five quarters since the middle of 2013, permits growth has averaged less than 1% per quarter. Based on the low growth in permits, I anticipated starts and spending growth would slow dramatically in 2014. Both new starts and spending did slow considerably.

My original estimate for 2014 was 1,050,000 total new units. For the first half of 2014, actual starts averaged an annual rate of only 955,000 new units. To achieve my original estimate, starts for the last six months would need to increase by 20% from the first half, an unrealistic rate of growth. Based on slow performance through August, I’ve lowered my prediction to 996,000 new housing starts for 2014, growth of only 71,000 new units or 7.5% from 2013.

Revised estimates available for New Housing Starts in 2014 ranged from 958,000 to 1,100,000, with all but one of those estimates within 1% of 1,000,000.

The lower prediction of new housing starts in 2014 also supports my revision to a lower spending forecast. My original estimate for 2014 residential spending was $379 billion, now lowered to $358 billion.

Early estimates available for New Housing Starts in 2015 include three estimates that are 1.3 million or higher, which implies a growth rate of 2 to 3 times the historical maximum growth rate. Those three were considered unachievable and removed from our data. The remaining estimates range from 1,100,000 to 1,170,000, with an average of 1,143,000.

I expect a growth of 140,000 new housing starts in 2015 for a total of 1,136,000.
Inflation Adjusted Volume
Inflation Adjusted Volume

**Real volume can only be tracked by analyzing spending after inflation.**

Spending is typically reported in unadjusted dollars, and total revenue is reported in current dollars (for current dollars, see Table 2 on Page 15). It is a true indication of current dollars spent within any given year, but does not give quite as clear a comparison of constant dollar volume from year to year. To see a clear comparison of volume from year to year, we must look at inflation adjusted dollars, constant dollars (for constant dollars see Table 8 below).

**2014 volume has not yet returned to the level of 1993 in constant dollars.**

If spending increases by 2% from one year to the next, but inflation drives up the cost of products by 5% during that same time, then inflation adjusted dollars would show that net volume actually declined 3% during that time period. Dollars spent would have needed to grow by 5% just to keep pace with inflation at zero volume growth compared to the previous year.

Table 8 adjusts total construction spending for construction inflation and the changes in margin costs. All dollars in Table 8 analysis are adjusted to 2014 constant dollars. The rate of inflation each year is determined individually for nonresidential buildings, nonbuilding heavy engineering and residential.

Current dollars total construction spending from 1999 to 2006 increased from $745 billion to the peak of $1.167 trillion for a total spending growth of 57%.

Constant dollars volume shows that real construction volume varied by no more than 2% from 1999 to 2006 and finished 2006 exactly the same as in 1999. Peak constant dollar volume was reached in 2000 and again in 2005.

**TABLE 8:**

Total Construction Spending Summary 2007-2015 (constant 2014$)

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>Forecast</th>
<th>Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonresidential Bldgs</td>
<td>416.7</td>
<td>431.8</td>
<td>393.3</td>
</tr>
<tr>
<td>% change year over year</td>
<td>10.9%</td>
<td>3.6%</td>
<td>-8.9%</td>
</tr>
<tr>
<td>Nonbuilding Hvy Engr</td>
<td>282.2</td>
<td>290.8</td>
<td>305.7</td>
</tr>
<tr>
<td>% change year over year</td>
<td>8.4%</td>
<td>3.0%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Residential</td>
<td>458.0</td>
<td>370.4</td>
<td>294.2</td>
</tr>
<tr>
<td>% change year over year</td>
<td>-17.5%</td>
<td>-19.6%</td>
<td>-21.8%</td>
</tr>
<tr>
<td>Total</td>
<td>1166.9</td>
<td>1099.0</td>
<td>993.2</td>
</tr>
<tr>
<td>% change year over year</td>
<td>-3.0%</td>
<td>-5.8%</td>
<td>-9.6%</td>
</tr>
</tbody>
</table>

Residential includes new, remodeling, renovation and replacement work.

Source Data: U.S. Census Bureau, Department of Commerce.

Indices references: Gilbane Margin Index, Selling Price indices, NAHB New Home Price Index, BLS PPI inputs see Escalation Growth vs. Margin Cost for inflation/deflation adjusted margin cost
Construction inflation during the period of 1999 to 2006 was 40% for nonresidential buildings and more than 75% for residential buildings, accounting for all of the growth in spending.

Residential spending increased 200% from 1993 to 2005, an average of 10% per year. However, in constant after-inflation dollars, real volume increased by only 36% during that time.

**2013 revenue increased by 5.7% compared to 2012, but 2013 volume increased by only 0.1% after inflation. I expected 5.3% revenue growth in 2014, but due to rapidly increasing escalation, 2014 volume growth was only slightly more than 1%.**

We will return to peak spending in 2016 or at latest early in 2017, but we are still 22% below peak volume. At the historical highest rate of volume growth (average over any 3 years equals +4% per year) it would take six more years to return to the historical level of peak volume. Realistically, we would not expect to maintain the historical highest rate of growth for six consecutive years. Therefore, it is likely we will not return to peak volume until after 2020.

**WHY IS IT SIGNIFICANT TO ANALYZE BOTH REVENUE AND VOLUME?**

Contractor fees are generally determined as a percentage of revenue. However, workload volume determines the size of the workforce needed to accommodate the annual workload. It is valuable to know how many employees were required to accomplish the workload volume based on the past several years of data. From the standpoint of workforce planning, we are not so much concerned with the value of the revenue as we are with the volume of the work. There is a bit more to this analysis, so we will investigate this further in the Jobs/Productivity section of this report.
Jobs and Unemployment
Jobs and Unemployment

We track the number of jobs as the measure of how many people are currently working to accomplish the construction spending put-in-place. The unemployment rate shows how many more people are available to go to work. Both added together shows us the size of the workforce. The size of the workforce is important because it tells us how many workers are available to draw from for future volume growth.

Table 9 on Page 28 includes both residential and nonresidential construction employment, as well as all trades and management personnel. The BLS suggests not using any single month but look at long term trends in the data.

We gained 290,000 jobs over the last 12 months. For 2014, jobs growth averaged 24,000 per month, the fastest rate of growth since 2005. From March to October 2014, we averaged only 18,000 jobs per month. Over the last three months, jobs growth averaged 28,000 per month.

The unemployment rate in construction is now at 8.3% after hitting a seven-year low of 6.4% in October 2014. The historical long-term average is between 6% and 7%. In February 2010, the construction unemployment rate hit 27%.

Individually, neither jobs nor unemployment provides us the full picture about the condition of the workforce. If the unemployment rate goes down, but there are few gains in the number of new jobs, that can only mean one thing—the number of people reported still in the workforce has gone down. The workforce declined because workers have either retired, been discouraged from seeking work and no longer qualify for benefits, or moved on to another profession.

As can be seen from the last several years’ data, the unemployment rate can be headed downward without equally increasing jobs. The drop in the construction unemployment rate was almost entirely due to workers dropping out of the construction workforce.

The reduction in available workers in the workforce will continue to have a detrimental effect on cost and schedule.

The construction industry had been losing employees for more than five years. We reached a low point of jobs in January 2011, but we didn’t fall to the low point of workforce until mid-2013.

The total construction workforce hit a 15-year low in 2013 at about 6.4 million. Currently the workforce is growing and is near 6.7 million, still near a 15-year low, about 1.5 million (~18%) lower than the 2006-2007 peak.
From January 2010 to October 2014, the total workforce dropped from 7.3 million to 6.8 million, or 500,000 workers. The workforce is still down 1.5 million from the 2006-2007 peak of 8.3 million workers.

During that same period we gained 600,000 new construction jobs.

During the same period, the total nonworking pool dropped by 1,000,000 workers from 1.7 million to 700,000.

If all of the 600,000 new jobs were rehires of workers that were in the nonworking pool, then the pool would have dropped from 1.7 million by 600,000, down to 1.1 million left in reserve, but the current pool has only 700,000 in reserve. Therefore the difference of 400,000 is workers lost from the workforce.

Of course, it is very likely far less than 600,000 new jobs were rehires. If only half were rehires and the remainder of new jobs were people previously outside the workforce, then the current reserve may have lost as many as 700,000 workers since January 2010.

Long term, if we are to see construction volume grow back even close to previous levels, we need the workforce to expand in tandem. Historically, it takes between 6,000 and 6,500 workers to put in place $1 billion worth of construction.

The unemployment rate is not seasonally adjusted. This adds to the short-term fluctuation. The seasonal fluctuation can be seen in Figure 8 on Page 25 where the upper (blue) line shows a repeated annual rise and fall in the unemployment rate. This analysis counts the available workforce or the non-working pool using the statistical trend line of the unemployment rate.
FIGURE 9:

**Construction Jobs vs. Construction Workforce 2005-2014**

**EXPECT WORKFORCE SHORTAGES**

Some of the workers that were let go, moved on or dropped out of the workforce had many years of experience and were highly trained. Unfortunately, some will never return. As a result, over the next few years the construction industry is going to be faced with a shortage of skilled, experienced workers. This will have the tendency to DRIVE COSTS UP and QUALITY DOWN due to the need to pay a premium for skilled workers and the necessity of training new workers in their job and company procedures.

- During periods of high volume and workforce expansion, productivity declines.
- Workforce shortages may force extended work schedules.

*The BLS Job Openings and Labor Turnover Survey (JOLTS) for the construction sector is now 136,000 unfilled positions, up from last October. The number of open positions has been over 100,000 for 20 of the last 22 months. A relatively high rate of openings, this generally indicates high demand for labor and could lead to higher wage rates.*

The job openings rate has been elevated since January 2013. The last time it stayed this high was 2007, leading into the peak of the previous expansion. A big difference is that this time around, we have 1.5 million or 20% less workers in the workforce. This is a good sign for future hiring, but highlights the importance of workers having the right skills. Over the next five years, we can expect shortages of skilled workers, declining productivity and rapidly increasing labor cost. If you are in a location where a large volume of pent-up work starts all at once, you may be the first to experience these three issues.

**MANPOWER EMPLOYMENT OUTLOOK Q1 2015**

The Manpower survey measures the percentage of firms planning to hire, minus the percentage of firms planning to lay-off, and reports the results as the “net” percentage hiring outlook. The overall national employment (all jobs) picture is positive for Q1 2015 with a projected net +16% (seasonally adjusted) of firms planning to hire. This is the strongest employment outlook since Q1 2008.

The Manpower report indicates the construction industry sector should experience increased hiring in Q1 2015 in all regions. Manpower reports total hiring in the construction industry for Q1 2015 is anticipated to be a net +15%. The Northeast expects a net increase of +14%; Midwest +20%; South +14% and West +15%.
Jobs/ Productivity
A long-term trend in productivity can be found by comparing the annual inflation adjusted volume to the annual average workforce. We developed volume in a previous section by adjusting spending for inflation. Productivity is a measure of unit volume per worker, not dollars put-in-place per worker. The following productivity analysis is based on put-in-place revenues, inflation adjusted to constant 2014 dollars, and compared to actual manpower at average hours worked.

In Figure 10 below, a line is plotted for the number of jobs per $1 billion spending “unadjusted.” That is a result obtained by using unadjusted spending dollars without considering inflation. The unadjusted analysis does not represent constant dollar volume of units put-in-place.

Figure 10 also shows a line plotting the number of jobs if spending were indexed solely using the ENR-BCI, the most common construction cost index. Since that index does not account for actual selling prices including margins, it does not represent true construction cost inflation and therefore it also produces an inaccurate result.

The thick blue line in Figure 10 below plotting #jobs per $bil 2014$ shows the only accurate result. Since 2012, the number of workers to complete $1 billion of constant volume has increased from about 6.0 million to 6.3 million. That’s a 7% loss in productivity in three years.

**FIGURE 10:**
Jobs per $billion 2001-2015 in constant 2014$
Revenue has a strong influence on hiring, but revenue can sometimes be influenced by rising inflation without regard to real change in volume. If spending is increasing rapidly, but mostly due to inflation, volume may not be increasing and the need to add rapidly to the workforce may not be entirely warranted.

On average, $1 billion of spending supports approximately 6,000 to 6,500 construction jobs. At the peak activity in 2006-2007, it required nearly 6,500 jobs to put in place $1 billion in spending (less volume per employee). Productivity declined to its lowest point in 2007. But growth in new work volume reversed and by 2010 productivity increases were so significant that $1 billion of spending supported only 6,000 jobs. Today, $1 billion in spending supports about 6,300 jobs.

All data in Figure 10 on Page 31 shows national averages. In a location where the city cost index is 1.2, it would take $1.2 billion in spending to support 6,000 jobs and in a location where the city cost index is 0.85, only $850 million in spending would support 6,000 jobs. That means that an average revenue put-in-place of $166,000 supports one job, but it can range from $140,000 to $200,000 per job due to variations in location.

When spending and jobs are on the decline and with diminished workload providing no other options, workers and management find ways to improve out of necessity. But at some point, longer hours and additional work burden causes productivity to decline. Also, a return to volume growth results in an easing of performance. It appears the trend began to reverse in 2010. After two years of work output increases, the work output reversed and finally declined in 2011.
As workload begins to increase in coming years, net productivity gains will decline somewhat. This net effect cannot go unaddressed. The results of productivity declines are either decreased total output (if workforce remains constant) or increased workforce needed (if total workload remains constant).

**JOBS EXPANSION MUST BE BASED ON VOLUME, NOT REVENUE**

Contractor fees are often determined as a percentage of revenue. However, workload volume is used for planning the size of the workforce. It is valuable to know, from the past several years of data, how many employees were required to accomplish the workload volume. From the viewpoint of workforce size, we should not be concerned with the value of the revenue only the volume of the work. It is not uncommon to see early estimates of staff requirements based on a percentage of revenue. That is a false representation and cannot be accurately relied upon to project staff, unless revenue is first converted to volume.

As an example, at the 2008 peak of construction cost, a building cost $12 million and took 100 men per year to build. In 2010, that same building potentially cost as little as $10 million to build, 20% less. Did it take 20% fewer men per year to build it? No, certainly not. That would be the fallacy of trying to determine jobs needed based on unadjusted revenue.

The building has not changed, only its cost has changed. It still has the same amount of steel and concrete, brick, windows, pipe and wire. Using revenue as a basis, we might be led to think we need 20% fewer workers. However, there is a need to base workers on inflation adjusted volume and productivity, not simply on direct annual revenue.

**WORKFORCE EXPANSION**

During the most rapid sustained period of jobs expansion in the last 30 years, the workforce grew by 1,000,000 jobs over 36 months, only 15% over three years, resulting in an average of 28,000 jobs per month. Construction spending during that 36-month span increased 12%; however, inflation-adjusted constant dollar volume increased by less than 6%. This was during a period when construction volume reached the all-time peak. Such a rapid workforce expansion during a period of a high level of spending led to measurably significant lost productivity.

If we experience uninterrupted economic expansion at a rapid level for the next five years, it will produce an extremely active market, there will be worker shortages, and productivity will decline—potentially erasing most or all of the gains realized in the last few years. When that occurs, it leads to rapidly increasing prices.

“Workload volume is the foremost defining factor for determining the size of the workforce.”
HOW MANY JOBS GET CREATED BY CONSTRUCTION?

Here are some details regarding how many jobs get created for every dollar spent on construction. For further reference, see Jobs and Unemployment section beginning on Page 26.

- Historical averages (adjusted for inflation) since year 2000 show the number of direct construction jobs supported by $1 billion in construction spending varies +/- from 6,000 jobs. That calculates to one job for every $165,000 (in 2014 dollars) spent on construction, or 6.0 to 7.0 jobs per $1,000,000 spent. Direct construction jobs include all Architecture/Engineering/Construction (AEC), but not, for instance, lumber or steel mill product manufacturing.

- The importance of correcting for inflation cannot be understated. A rate of $140,000 to $160,000 (in 2013 dollars) per job, at 3.5% inflation, five years ago was $120,000 to $135,000. Five years from now, one job will require $166,000 to $190,000. The long-term historical average for construction inflation is 3.5%, but in the last 10 years has ranged from -8% to +10%.

- In part, the wide variation in the number of jobs created is a result of productivity. In times of increasing work volume activity, productivity declines. In times of decreasing activity, productivity climbs. In 2009, the worst decline in construction activity in my historical records, productivity increased by an average 8%. Because productivity increased, it took fewer workers to put in place the same volume of work. The net result is that $1 billion in spending supported far less jobs than previous years.

- As work volume starts to increase over the next few years, expect productivity to decline. There are many reasons why this will occur, among them: working longer hours until new workers are brought on; working more days; crowding the work area; hiring less qualified workers; and acclimating new workers to the crew.

- The type of work also affects the number of jobs supported, with higher cost buildings supporting fewer jobs than lower cost buildings. For example, $1 billion of life sciences or hospital projects supports fewer workers than $1 billion of residential or general commercial projects because the materials costs are considerably higher and therefore a greater percentage of the total cost is allocated to materials.

There are several studies available, including one by the federal government and one by the Associated General Contractors of America (AGC), that state for every construction job, there are three additional jobs created in the economy. So while $1 billion of building construction may create as many as 7,000 direct construction jobs, overall it generates approximately 28,000 jobs in the economy.
Behind the Headlines

**Total 2014 Construction Spending Expected Up 5.5%. 2015 Expected Up 7%**

Growth in spending doesn’t provide a clear picture of the growth in real volume. In constant inflation adjusted dollars, total 2014 spending did not reach the level of 1993 spending. Inflation adjusted construction spending reached a peak in 2000. It remained nearly level from 1999 through 2006. From 2006 to 2011, volume declined by 28%. **Current volume is still 22% below the peak level of spending.** We would need to equal the volume growth rate of the four best years in the last 20 years to return to peak level before 2019. In 2014, construction volume increased by only 1.1%. In 2015, spending should grow 8% but volume will grow only 3%. We will probably not reach previous construction volume levels until 2021 or 2022.

**Construction Volume is #1 Driver of Construction Cost**

I agree 100%. But then the analysis continues to state residential volume is now 50% above its recent bottom and nonresidential volume is up 20%. However, the analysis fails to differentiate between spending and volume. Once we take out inflation and look at spending in constant 2014$, we see residential volume is up by 30% and nonresidential buildings volume is up by only 7% off the bottom. All the rest of the growth in spending is inflation.

**Unemployment Reaches 7-year low in October**

Don’t be alarmed when it climbs back up a few points between November 2014 and March 2015. The unemployment rate is not seasonally adjusted and after going down every summer, it goes up every year between those months, usually by about 4 or 5 points, reaching a high in January – March period, whether jobs go up or down.

**Construction Jobs Up 13% from January 2011 Low**

Yes, that’s true. However, what is left unstated here is that hours worked, which gets applied to the entire workforce, is also up. Since January 2011, jobs are up 13%. Total new jobs plus hours worked results in total labor effort, which is UP 18% since January 2011. **So if you are only tracking new jobs, you are missing more than 40% of the total labor effort growth.**

“We’re hopeful that construction volume levels reached in 2000 will return by 2021 or 2022.”
Some Signs Ahead
Some Signs Ahead

The following reports can be accessed by clicking on the hyperlinks provided.

**Architectural Billings Index (ABI)** measures monthly work on the boards in architectural firms. It is a 9 to 12 month leading indicator to construction. Index values above 50 show increasing billing revenues and below 50 indicates declining revenues. After 13 consecutive months being positive, the ABI Institutional Index went negative for 10 months. The Commercial Index has dipped into negative territory only three times in the last 21 months.

**Associated Builders and Contractors (ABC) Construction Backlog Indicator (CBI)** is a quarterly forward-looking economic indicator reflecting the amount of work that will be performed by commercial and industrial contractors in the months ahead. The CBI is measured in months of backlog and reflects the amount of construction work under contract, but not yet completed.

ABC Charts and Graphs for Q3 2014 show all of 2013 strongly above 2012. The first quarter 2014 CBI at 8.1 months is the fourth consecutive quarter above 8.1. Heavy industrial CBI dropped to all-time lows in Q3-Q4 2013 and, although up slightly in Q1 2014, is still at third lowest in history. Infrastructure CBI dropped for four consecutive quarters and has only rebounded slightly in Q1 2014. Commercial and institutional backlog increased every quarter from Q1 2012 to an all-time high of 8.9 months in Q4 2013. It went down slightly for Q1 2014 to 8.4 months. The index was created in Q1 2009 so there is no comparison to pre-recession workload.

**Dodge Momentum Index (DMI)** is a monthly measure of nonresidential projects in planning, excluding manufacturing and infrastructure. It is a leading indicator of specific nonresidential construction spending by approximately 12 months. It bumped up and down, peaking in January 2014 but then dipped in March. It peaked again in June but continues to move up and down. The trend is up.

![FIGURE 11: Dodge Momentum Index](image)

The DMI had strong upward movement in early 2013 but then settled into a more narrow range for 10 months. After three strong months again we had a decline. The statistical trend is still UP. The index shows the strongest correlation in the commercial sector at a nine-month lag and the institutional sector, with a strong correlation at a 15-month lag.
**AIA Consensus Midyear 2014 Construction Forecast** is a semi-annual survey of construction economists’ projections for future spending. Posted on the AIA economics page, the mid-year 2014 report of average expectations for nonresidential construction showed expected growth of 4.90% for 2014 and 8.0% for 2015. The greatest expected growth is for the commercial and office construction sectors.

**AGC 2014 Construction Hiring and Business Outlook** published in January indicates contractors are more optimistic than they have been since the recession began. It highlights that contractors expect markets to grow but also expect it will be more difficult to hire qualified workers. See survey results here.

**Engineering News-Record 2014 Third Quarterly Cost Report** shows general purpose cost indices up on average about 2.5% year over year. However, special purpose building indices for nonresidential buildings are up on average 3.3% and selling price indices are up 4.3%. The difference between these indices is increased margins. *(Subscription required).*

**FMI 3rd Quarter 2014 Nonresidential Construction Index (NRCI)** is now 65.8, up from last quarter and well up from all of 2013. The NCRI is a report based on a survey of opinions submitted by nonresidential construction executives. The NCRI declined in Q4 2013 but has strongly rebounded.

**FMI Construction Outlook 3rd Quarter 2014 Report** predicted residential construction would increase 11% in 2014, office construction 8%, commercial construction 6%, education 0% and healthcare construction will decrease 2%. FMI is currently predicting 7% spending growth in 2014 and 7% growth in 2015.

**CMD Construction Data** December report predicted residential construction will increase 6.7% in 2014, office construction 18.2%, commercial construction 10.2%, educational 0.2% and healthcare construction will decrease 7.1%. CMD currently predicting 6.8% spending growth in 2014 and 9.8% growth in 2015.

**McGraw Hill Construction report on Green Building** says by 2015, half of all nonresidential building will be Green. From 2008 to 2011, the share of educational Green building went from 15% to 45%. Only 10% of building cost and function is operational. Green investment is also social–improving the environment for employees.

**Institute for Supply Management (ISM) Non-Manufacturing Index (NMI) report** for November, released December 3, 2014, is a better indicator of activity in the construction industry than the ISM manufacturing report. The NMI measures economic activity in 13 industries (including construction) not covered in the manufacturing sector. The November NMI was 59.3, above 52 for 59 consecutive months, indicating continued economic growth. Construction reported growth in business activity, new orders, employment, slower deliveries, prices paid, and increased backlog, perhaps the strongest NMI report for construction that I’ve seen in many months.
The U. S. Census Bureau Producer Price Index (PPI) data for June indicates the PPI for construction materials decreased 0.8% in the month and is up only 0.6% year over year. The largest increases of the year almost always occur early in the year with the fourth quarter often negative.

**The November 2014 PPI for Material Inputs to All Construction**
- decreased 0.8% in the month, decreased 1.9% over three months, but is up 0.6% in 12 months

**The November 2014 PPI for Material Inputs to Nonresidential Construction**
- decreased 1.1% in the month, decreased 2.3% over three months and is flat for 12 months

### TABLE 10:

**BLS PPI Materials November 2014**

<table>
<thead>
<tr>
<th>Materials PPI</th>
<th>Percent Change Versus to Nov 2014 from</th>
<th>annual for</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oct-14 1 month</td>
<td>Aug-14 3 months</td>
</tr>
<tr>
<td><strong>Summary</strong></td>
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<td></td>
</tr>
<tr>
<td>Inputs to ALL Construction</td>
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<tr>
<td>Inputs to Nonresidential</td>
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<td><strong>Commodities</strong></td>
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<tr>
<td><strong>Manufactured Materials</strong></td>
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<td>Asphalt Paving</td>
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<td>Precast Conc Products</td>
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<td>0.1</td>
</tr>
<tr>
<td>Building Brick</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Copper &amp; Brass Mill Shapes</td>
<td>0.0</td>
<td>-2.4</td>
</tr>
<tr>
<td>Aluminum Mill Shapes</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>HR Bars Pkt &amp; Stret Shapes</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Steel Pipe and Tube</td>
<td>-0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>Fab. Structural Steel</td>
<td>-1.5</td>
<td>-1.7</td>
</tr>
<tr>
<td>Fab. Bar, Joists and Rebar</td>
<td>-0.1</td>
<td>-0.2</td>
</tr>
<tr>
<td>Gypsum Products</td>
<td>0.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Insulation Materials</td>
<td>-0.2</td>
<td>-2.9</td>
</tr>
<tr>
<td>Lumber and Plywood</td>
<td>-1.0</td>
<td>-2.4</td>
</tr>
<tr>
<td>Sheet Metal Products</td>
<td>-0.3</td>
<td>-0.5</td>
</tr>
</tbody>
</table>

*All data not seasonally adjusted*

PPI Items UP the most in price year over year:
• Gypsum products, aluminum shapes, HR bars plates and shapes and ready-mix concrete

PPI Items DOWN the most in price year over year:
• Diesel fuel and copper

The relative impact of cost changes for several materials is a function of how much the material is used within a typical building. For example, for a typical nonresidential building:
• 10% increase in gypsum wallboard material increases typical project cost by 0.05% to 0.08%.
• 10% increase in copper material increases typical project cost by 0.20% to 0.60%.
• 10% increase in concrete material increases typical project cost by 0.20% to 0.60%.
• 10% increase in structural steel material increases typical project cost by 0.50% to 1.00%.

The PPI for construction materials gives us an indication whether costs for material inputs are going up or down. The PPI tracks producers’ cost to supply finished products. This tells us if contractors are paying more or less for materials and generally indicates what to expect in the trend for inflation.

Understand PPI trends to help interpret the data.
• 60% of the time, the highest increase of the year in the PPI is in the first quarter
• 90% of the time, the highest increase of the year is in the first six months.
• 75% of the time, two-thirds of the annual increase occurs in the first six months.
• In 20 years, the highest increase for the year has never been in Q4
• 60% of the time, the lowest increase of the year is in Q4
• 50% of the time, Q4 is negative, yet in 22 years the PPI was negative only twice

So when we see monthly news reports from the industry exclaiming “PPI is up strong for Q1” or “PPI dropped in the 4th Qtr.”, it helps to have an understanding that this may not be unusual at all and instead may be the norm.

“Producer Price Index (PPI) tracks cost to supplies on construction materials – providing a strong indicator for inflation trends.”
Material Price Movement
Material Price Movement

When the cost to the supplier goes up, it almost always gets immediately passed along in full to the consumer. When the cost to the supplier goes down, the savings trickle down to the consumer very slowly.

Cost for material inputs to all construction increased 1.0% in the last 12 months.

Cost for material inputs to nonresidential construction increased 0.5% in the last 12 months.

### TABLE 11: BLS PPI Markets November 2014

<table>
<thead>
<tr>
<th>Materials PPI</th>
<th>Percent Change Versus to Nov 2014 from</th>
<th>annual for</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oct-14 1 month</td>
<td>Aug-14 3 months</td>
</tr>
<tr>
<td>Summary</td>
<td>-0.8</td>
<td>-1.9</td>
</tr>
<tr>
<td>Inputs to ALL Construction</td>
<td>-1.1</td>
<td>-2.3</td>
</tr>
<tr>
<td>Inputs to Nonresidential</td>
<td>-0.7</td>
<td>-1.5</td>
</tr>
<tr>
<td>Inputs to Commercial</td>
<td>-0.8</td>
<td>-1.9</td>
</tr>
<tr>
<td>Inputs to Industrial</td>
<td>-1.3</td>
<td>-2.8</td>
</tr>
<tr>
<td>Inputs to Hwy/Hvy Engr</td>
<td>-0.6</td>
<td>-1.4</td>
</tr>
</tbody>
</table>

All data not seasonally adjusted


Since 2011, costs for gypsum products increased 41%; lumber increased 25%; ready-mix concrete increased 11%; asphalt paving increased 8%; fabricated structural steel increased 1% and copper decreased 8%. Steel pipe and tube cost increased only 12% and diesel fuel decreased 10% and scrap steel decreased 19%. This extreme variability means individual trades assessment requires individual material index data.

Costs of gypsum, lumber and plywood and insulation are driven primarily by residential markets. Structural steel products are driven more by nonresidential markets.
Random Lengths, a lumber industry newsletter, recently reported the composite price index for 15 key framing lumber prices at $366, down 11% from the 2014 high of $414 and down 20% from an eight-year high in April 2013. Year-to-date low was $362 set in April.

70% of lumber demand is driven by residential housing.

Cement / Concrete / Asphalt

Portland Cement Association (PCA) reports the volume of cement demand as an indicator of economic activity. It is a reliable coincident indicator. PCA reported an 8.9% rise in consumption in 2012 and consumption grew 4.5% in 2013. 2014 was projected to grow by 8.1%.

Nearly two-thirds of U.S. cement consumption occurs in the six months between May and October. Rising consumption and prices leading into summer can lead to large shifts in demand and seasonal pricing and is not an indicator of long-term growth but only reflects periodic seasonal fluctuating consumption rates. Look at total annual volumes for trends.

Cement prices increased 3.4% in 2012, after dropping four years in a row. Cement prices increased 4.7% in 2013. Year-to-date Portland cement prices are up 5%. IHS Global predicts cement prices will rise 4.6% in 2015.

For 2010 and 2011, cement consumption decreased 46% from peak 2008. At the start of 2013, PCA predicted consumption for 2013 would grow 8%. PCA revised data shows 2013 was only 4.5% growth over 2012. 2014 growth is projected at 8.1%. PCA projects consumption by 2018 will be 119mmt. That will require five years of minimum 8.5% growth.
FIGURE 14:  
Materials PPI Index Cement Concrete Asphalt 2006-2014

Ready Mix Concrete price increased 2.9% for 2013. For the last 12 months PPI shows another +4.5% ENR has +4 year-to-date 2014. That’s a 7% increase in two years. Global Insight predicts cement prices will rise only 4.6% in 2015.

FIGURE 15:  
Materials PPI Index Brick Block Precast 2006-2014

Concrete block and brick increased only 2.1% in 2013. Through the 3rd quarter 2014 cost was up another 4%. Precast product prices have moved up only 3.5% since December 2012.
**Structural Steel**

The construction industry is the largest consumer of steel products worldwide. Approximately 100 million tons of steel is produced annually in the United States. More than 40 million tons of that is delivered to the construction industry. The next largest industries combined (automotive, equipment and machinery) do not consume as much steel as construction.

Structural steel is the most used structural framing material in the United States, with a 58% of market share for nonresidential and multi-story residential buildings, based on square footage built. The next closest framing material, concrete, holds only 21% market share.

---

**FIGURE 16:**

*Materials PPI Index Iron and Steel Products 2006-2014*

The rapid rise in 2008 mirrors the rapid acceleration in bid pricing to the peak in Q3-Q4 2008, and the precipitous fall from that peak. By mid-2009, the mill price of steel products had experienced a 40% decline, retreating to a 2004 low. Today the PPI for pipe, tube, bars and plates has recovered all of those losses, but not fabricated structural, joists or rebar.

Steelworks.org reports adjusted year-to-date steel mill capacity utilization currently at 77% as of December 6, 2014. Capacity utilization is below the post-recession high of 79% in March 2012.

Steel demand in 2013 was flat from 2012. Early in 2013, economic analysis indicated that there was over-capacity in steel production. This did prove to be true, and it helped cause steel prices to fall or remain flat in 2013. This year demand is up.

*Steel manufacturer Gerdau Corporation reports that year-to-date demand is up approximately 10% for structural shapes, bars and reinforcing. Demand for structural pipe and tube is up 72%.*

*ENR’s latest data indicates that wide flange steel prices increased 1.5% since February bringing prices level with a year ago.*

*The PPI indicates fabricated structural steel cost is up only 0.2% in the last 12 months.*

Structural steel is very much dependent on recycled steel. Structural steel is made 90% from scrap steel. Scrap prices are down 11% in the last year.
Copper is a leading economic indicator that has rarely (if ever) failed to indicate the direction of world economies. When copper rises in price, world economies are leading into expansion. When copper drops in price, a decline in world economies quickly follows. Copper prices and the U.S. workforce move almost perfectly together. Also, because copper is so widely used in buildings and manufacturing facilities must be built to see a big increase in production, copper demand is an excellent predictor of industrial production 12 months out.

Click here to view copper price charts on metalprices.com

What drives copper prices up or down? Unlike some other metals, it is not speculation. Quite often it is demand. Increasing demand equals increasing prices. When demand wanes, prices drop.

What effects do copper price changes have on the cost of our projects?

Roughly speaking, copper material is about:

- 10% electrical contract or 1% of cost of project
- 5% of an HVAC contract or 0.6% of cost of project
- 10% of a plumbing contract or 0.3% of cost of project

For an average project, copper material can represent approximately 2% of the total cost of the project. Therefore, a 10% increase in the cost of copper will increase the cost of a project by 0.2%.

There are exceptions. For example, if copper is 2% of the total cost of the typical project, it is probably 4% to 5% of total cost on a heavy mechanical/electrical project, such as a data center. So a 10% increase in the cost of copper increases the total cost of a data center by 0.4% to 0.5%. For a copper roof, material is 65% of total cost and can represent ~1% of typical project cost.
Architectural Billing Index
The Architectural Billings Index (ABI) is a leading indicator for nonresidential work 9 to 12 months out. Index values above 50 indicate more architectural firms reporting increasing billings than firms reporting decreasing billings. Index values below 50 indicate declining workload. Index values remaining consistently below 50 indicate there will be a decrease in construction spending 9 to 12 months later.

The ABI is primarily a nonresidential indicator. Residential design projects account for only about 15% of the total index. Office buildings, hotels, shopping centers, banks, warehouses, manufacturing plants and other commercial properties represent 35-40% of the index. Institutional buildings account for 45-50% of the index. Typically, institutional facilities are the last nonresidential building sector to recover from a downturn.

The 2012 drop in the ABI from March through June predicted nonresidential work would be down through Q4 2012 into Q1 2013 with recovery starting in Q2 2013. Institutional billings were declining from January 2011 to June 2012 and commercial work declined from April to August 2012. We expected spending in Q1 and Q2 2013 to be down and it was down. The March-April 2013 ABI indicated a decline in spending for Q1 2014, which did occur. The November 2013 to April 2014 ABI indicates we may see another brief slowdown in nonresidential spending during Q1 2015.
Consumer Inflation/Deflation
Consumer Inflation/Deflation

The Moore Inflation Predictor® (MIP) is a highly accurate graphical representation of the future direction of the inflation rate. It has a 97%+ accuracy rate forecasting inflation rate direction and turning points and over 90% of the time the inflation rate falls within the projected “likely” range.

A review of long-term inflation data shows there are seasonal aspects of inflation with some fairly consistent trends. It appears that the majority of inflation occurs in the first half of the year and then moderates for the second half. Since 2001, there have been eight deflationary fourth quarters and only three inflationary fourth quarters, even though the overall trend is inflationary. MIP expects we will experience deflation in the fourth quarter 2014.

![Moore Inflation Predictor Consumer Inflation 2013-2015](MIP chart used by permission, Tim McMahon, Editor, Financial Trend Forecaster www.fintrend.com)

It is possible that several years of stimulus and easy money policy may eventually lead to strong inflation. However, to date that has not occurred. In fact, some analysts question if that will occur. In 2013, MIP predicted peak inflation most likely at 2.4% and year end inflation at 1.7%. Actual results in 2013 were peak inflation at 2.0% and year end inflation at 1.5%. In the worst case scenario, a year from now we could potentially see inflation range between 3% and 4%. The MIP does not project 3% to 4% inflation at any time within the next 12 months but predicts 12 months from now we will be near 2%.
Construction Inflation
Construction Inflation

Construction inflation, based on several decades of trends, is approximately double consumer inflation. From mid-2009 to late 2011, that long-term trend did not hold up. During that period, construction inflation/deflation was primarily influenced by depressed bid margins that had been driven lower due to diminished work volume. Over the last 24 months that has changed. Work volume has increased and short-term construction inflation has increased now to more than double consumer inflation. If consumer inflation reacts to money policies by accelerating and if it holds true that long-term trends eventually return to the norm, we may soon be experiencing rapid acceleration in construction inflation.

The U.S. Construction Producer Price Index tables for Buildings Complete, which includes the cost complete as charged by the builder, represents true inflation cost of buildings.

Nonresidential buildings inflation, as depicted by PPI completed buildings data, shows 2013 building cost inflation ranged from 2.8% to 4.1%.

Through November, PPI building cost for 2014 annual inflation ranged from 1.8% to 2.2%.

Through November, PPI Trades cost for 2014 annual inflation ranged from 1.0% to 4.8%.

Industry indices show nonresidential building cost for 2014 average inflation ranging from 2.9% without margins to 4.3% final cost.

New housing price indices show 2014 residential annual inflation ranges 5 to 7%.
Construction volume will continue to increase in coming months and that will continue to support increasing margins. Therefore buildings’ total construction (final cost) inflation will outpace construction labor and materials inflation.

**Expect nonresidential construction cost inflation to remain above 4% for several years. See Escalation section (Page 69) for near-term and long-term recommendations.**

These average values, useful for adjusting whole building costs, cannot be considered to adjust a unique contract type. Construction inflation with a historical average range from 3% to 8% would not be accurate to adjust asphalt paving or shingles. Asphalt products increased 10% in 2005 and 2006 and 20% in both 2008 and 2009.

![Complete Trades Cost Index by Trade 2006-2014](image)
ENR Building Cost Index
ENR Building Cost Index

The December 2014 *Engineering News-Record’s* 20 Cities Average Building Cost Index (ENR-BCI) is 5480, up 2.9% year over year. Cleveland and St. Louis show a much higher than average inflation rate. Atlanta, Baltimore, Boston and Dallas are all below the ENR average inflation rate.

The ENR-BCI index increased 3.7% in 2010, 2.8% in 2011, 1.9% in 2012 and 2.2% in 2013.

The ENR-BCI is one of the most well-known and most widely used building cost indices. However, its long-term strengths can also be weaknesses, particularly in times of fluctuating selling prices because:

- It is made up of a small shopping basket of labor and materials. Therefore, it is not always the best representation of all building types, which can vary considerably in composition.

- That shopping basket includes no representation for any mechanical, electrical or plumbing items, which can comprise 30%-50% of the cost of the building. In many cases, the shopping basket comprises less than 20% of the building cost.

- Building materials differ widely in rate and timing of cost growth and can dramatically affect the cost of projects. In 2009, while structural steel products declined in price by 10% to 15%, copper products increased in price by 40%.

- ENR-BCI does not take into consideration bid prices, so it often does not represent the final cost of buildings. Bid prices are referred to as Selling Price, and this is not included in the ENR-BCI. Selling prices show increased or reduced margin bids due to market activity.

Starting in 2000, the ENR Building Cost Index has remained consistent, giving a consistent representation of building cost changes over time.

### TABLE 12:

<table>
<thead>
<tr>
<th>ENR Building Cost Index History (2000-2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base = 1913=100</strong></td>
</tr>
<tr>
<td>2000</td>
</tr>
<tr>
<td>2001</td>
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<td>2010</td>
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<td>2011</td>
</tr>
<tr>
<td>2012</td>
</tr>
<tr>
<td>2013</td>
</tr>
<tr>
<td>2014</td>
</tr>
</tbody>
</table>

Data reprinted by permission *Engineering News-Record* – ENR.com
There were several monthly declines in the ENR index from late 2008 through early 2010, but the annual average has gone up every year for 70 years. More importantly, from Q2 2008 through much of 2011, during the only recent period of true deflation, the ENR-BCI would indicate a 10% cost increase! The actual final cost of buildings, documented by several reliable measures, from Q2 2008 through Q4 2010 went down by 8% to 13%.

Whenever we have very active periods or very depressed periods of construction activity, contractor selling prices rise or fall accordingly, and since it does not track selling price, the ENR-BCI cannot reflect accurately what effect selling price had on the cost of buildings during those periods. Nonetheless, the ENR-BCI is often relied upon as an indicator of cost movement over time.

You must take into consideration the selling price of buildings, past and present, if you hope to accurately index the cost of buildings over time.

Selling prices are not captured in the ENR Index. For a procedure to adjust for actual selling prices see the “Indexing – Addressing the Fluctuation in Margins” section of this report, and refer to Figure 24 on Page 68: Escalation Growth vs. Margin Cost. This is particularly important for those of you using conceptual cost modeling tools such as the Gilbane CostAdvisor.
Indexing by Location – City Indices
Equally important as indexing for time is the process of indexing for location. The practice of using historical projects, regardless of location, to get an idea of cost of future projects is quite common. Not only must we move project costs over time, but also we must move location. City indices provide the means to move project costs from one location to another.

Suppose our historical project was built in Phoenix and we wish to determine the cost of a similar project built in Boston.

Assume
- Project cost as built = $10,000,000
- Boston index = 120
- Phoenix index = 90

Move costs to Boston from Phoenix;
Divide “To” city by “From” city
Multiply original cost by factor.
- Boston / Phoenix = 120/90 = 1.33x
- $10,000,000 x 1.33 = $13,300,000.

Through this example you can see the danger of simply using unadjusted project costs from one location to determine costs in another location. Without adjusting for differences in cost due to location, it is possible to over or understate project costs by substantial amounts.

ENR provides city indices for 20 major metropolitan cities. RS Means annually updates tables for hundreds of cities. The chart here lists 40 major cities from highest to lowest RS Means index. The ENR index is shown for those available.
Selling Price
Selling Price

Selling price is the total price at which a contractor is willing to bid to win a project, even if that selling price eliminates all profit from the bid.

Few inflation or material/labor cost predictors address the issue of bidders raising or lowering margins in bids and hence affecting what is known as selling price. Selling price is dramatically affected by economic conditions such as market volume and contractor booked revenue. When market volume is low, contractor’s margin or selling price comes down. As business volume picks up and once contractors secure more work, even if material prices stay low, contractors begin to increase their margins and selling price increases.

In many areas selling prices are still depressed, and it will take time before workload volumes increase to a point that contractors see a return to normal margins. Nearly 75% of contractors lowered margins in 2010 bids. More than 75% kept margins the same in 2011 or lowered them even more. In 2012 and 2013 we saw margins increasing. The AGC Business Outlook survey for 2014 indicates optimism at a post-recession high. That will lead to increased margins.

We are currently in a growth period as reflected in monthly construction spending. Although the monthly rate of spending took a significant drop in Q1 2013, it returned right back to the normal trend line in Q4 2013. Construction spending is projected to grow by 6% to 10% for the next several years. Although it may be several years before building market activity returns to pre-recession levels, there is clear and strong evidence that the rate of activity is increasing.

*Increasing activity leads to higher selling price.*
Contractors need to recover the cost for all expenses that affect their cost to build. Any cost not recovered is taken as a reduction to margin or reduced selling price. Cost recovered over and above expenses raises selling price and is a growth to margins.

- On average labor cost represents approximately 35% - 40% of building cost
- On average materials cost represents approximately 50% - 55% of building cost
- Equipment and contractor services represent 10% of building cost
- Margins are applied on all 100% of building costs

Labor wage cost growth is generally 2% to 3% per year. The labor wage cost long-term average is 3%. Labor demand and changes in labor productivity either increases or decreases total labor cost. In growth periods, labor demand tends to increase wages and productivity generally declines increasing overall labor cost.

Materials cost growth is tracked by several reports such as the PPI. Materials costs fluctuate widely, but in general and in times of higher demand material prices go up.

Equipment and services have the least effect on overall project cost. Contractor efficiencies or unusual project conditions may vary this cost.

Margins represent contractor overhead and profit. Selling price includes contractor margins and is market activity dependent. Competition will cause project bid margins to move lower. Increasing volume will allow margins to move higher.

- If labor wage costs go up by 3%, cost to project = +1.2%
- If productivity decreases by 2%, cost to project = +0.8%
- If material costs go up by 5%, cost to project = +2.5%
- If services costs go up by 5%, cost to project = +0.5%
- If margin increases by 1%, cost to project = +1%

During a period of low volume and competitive pricing (assuming no room for margins to move lower) margins are not increasing. During a period of margin recovery, anticipate a 1% to 1.5% annual increase to margins until margins fully recover.

When we see substantial growth in the volume of projects coming to bid, the need to keep margins reduced will diminish and margins will return to normal. There is no room left for depressed market activity to move margins lower. Expect margins to increase slowly over time.

Margins vary considerably by market and activity within individual markets.

Are Margins Increasing or Decreasing?

Indices like the PPI MTRLS deal only with materials costs or prices charged at the producer level. They do not include delivery, equipment, installation or markups, nor do they reflect the cost of services provided by the general contractor or construction manager.

Total project cost encompasses all of these other costs. Whole Buildings Completed PPI doesn’t give us any details about the retail price of the materials used, but it does include all of the contractors costs incurred for delivery, labor for installation and markups on the final product delivered to the consumer, the building owner.
The PPI for construction materials IS NOT an indicator of construction inflation. It is missing the selling price. In 2010, the PPI for construction inputs was up 5.3% but the selling price was flat. In 2009, PPI for inputs was flat but construction inflation as measured by cost of buildings decreased 8% to 10%.

For several years, we have had many construction firms competing for a very low volume of new work. In 2011 and 2012 construction spending, adjusted for inflation to get real volume, reached a 20-year low. There was little work available for bidders, forcing contractors to remain extremely competitive. As a result, contractors had been unable to pass on all cost increases to the owner. This had the effect of keeping selling price low, reducing both contractors and producers margins. In some cases margins may be reduced to a loss just to get work.

I expect whole building costs to rise and remain above material/labor inflation as long as work volume continues to increase.

### TABLE 13:
BLS PPI Buildings Completed 2011-2014

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs to Nonresidential</td>
<td>0.0</td>
<td>.9</td>
<td>.9</td>
<td>5.7</td>
<td></td>
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</tr>
<tr>
<td>New Nonresidential Bldg</td>
<td>2.2</td>
<td>3.3</td>
<td>15</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Industrial Bldg</td>
<td>2.1</td>
<td>4.1</td>
<td>14</td>
<td>3.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Warehouse Bldg</td>
<td>2.2</td>
<td>2.9</td>
<td>2.6</td>
<td>3.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New School Bldg</td>
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<td>3.4</td>
<td>12</td>
<td>4.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Office Bldg</td>
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<td>2.8</td>
<td>12</td>
<td>3.8</td>
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</tr>
<tr>
<td>New Health Care Bldg</td>
<td>18</td>
<td>4.1</td>
<td>-0.5</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*except inputs, includes labor, material overhead and profit*

*Source: Producer Price Index. Bureau of Labor Statistics*

To analyze the trend in margin movement, we need to combine data from several inputs. Spending data and jobs data provides what we need to determine productivity. Producer Price Index (PPI) gives the cost of materials from the producer but not the cost the contractor charges for the material. Whole building cost gives us the price charged by the contractor to the client, the total cost for all labor, materials, equipment, overhead and profit. Compare all these and we can determine the difference between the costs to the contractor and what the contractor charges. That difference is the margin added to get the selling price.
Margin growth resumed in 2012. Margins moved up and down in 2013 but finished the year positive. The PPI data showed 2014 growth in margins as slowing or even down, but an analysis of independent selling prices shows margins still increasing by over 2%.

The flow of projects coming to bid during the coming months will strongly influence the cost movement of the bids. If the volume of projects coming to bid decreases, overall construction business will remain depressed and bids will remain low, strongly influenced by depressed margins. When we see a continued increase in the volume of projects coming to bid, the need to keep margins reduced will diminish and margins will continue a return to normal.

**Indicators are pointing to growth signs, and that will eventually lead to a more normal bidding environment and higher margins.**
Indexing – Addressing the Fluctuation in Margins
We often look at the cost of previously built buildings as a historical guide for what to expect in the future. Escalation indices allow us to move the cost of buildings over time. City indices allow us to move for location. To index accurately we need to review margin and productivity movement to determine what effect they might have on current cost compared to current index.

Average costs of buildings from Q2 2008 through Q4 2010 fell by 13% to 15%. However, normal labor/material indices increased by 4% during that time. Normal indices will not account for all changes in individual material costs, wages, productivity changes and margin fluctuations.

Standard labor and material index tables will not address the inflection points in this unusual time period nor will standard labor and material inflation factors address productivity or margin fluctuation. Figure 24 on Page 68, “Escalation Growth vs. Actual Margin Cost”, illustrates this unusual period and provides a means to properly account for these unusual occurrences.

In Figure 24, the blue line indicates ENR-BCI actual values through April 2014 and predicted escalation near 3% over the next two years. The plotted values are three-month moving averages to smooth out the line. The red (thicker) line indicates Contractor Bid Price Movement or Adjusted Margin Cost representative of bids received.

Very low margin cost in mid-2010 reflects contractor bids at low cost to secure a portion of a dramatically reduced amount of available work. Predicted future cost shows long-term cost growth that accounts for both normal labor/material escalation equal to the escalation outlined above and a very slow but steady 0.5% per quarter recovery of margins over the next few years.

“For index accuracy, the careful review of margin and productivity movement is needed to best determine what effect they may have on the current cost.”
How to Use the Above Graph:

- If your project is not previously indexed using ENR-BCI, reference only the Margin index (red line).
- Pick the date for midpoint of the historical reference project.
- At that date, draw a vertical line so it passes through both curves.
- Now pick today’s date.
- At that date, draw a vertical line so it passes through both curves.
- Record the ENR Index at the historical reference date and today.
- Record the Margin Cost Index at the historical reference date and today.
- Subtract historical ENR index from today’s ENR index. Label that value A.
- Subtract historical Margin index from today’s Margin index. Label that value B.
- Pay attention to sign (+ or -).
- The difference between the movement due to the ENR index and the Margin Cost Index is the needed correction factor. Use the differences from the ENR Index (A) and the Margin Index (B) to develop an adjustment factor for your project. Since baseline is 100, all factors are the same as percentages.
- B minus A = Margin Adjustment factor. Pay attention to signs (+ or -).
- CostAdvisor users can record the Margin Adjustment value determined here into the Similarity Adjustment factor field. Treat all system indexing and future escalation as you would normally.
Escalation – What Should We Carry?
Escalation – What Should We Carry?

We tend to think of escalation as one simple value. An estimator typically prepares a budget in today’s dollars, but then must escalate the total estimate to the midpoint of the project construction schedule. As explained in prior sections, when determining escalation, the value must account for several factors.

**Escalation must account for all anticipated differences from today’s cost to expected future cost.**

To move costs from today’s dollars to future dollars, we must account for the cumulative effect of:

- *Market activity*
- *Labor wage rate changes*
- *Productivity changes*
- *Materials cost changes*
- *Equipment cost changes*
- *Margins fluctuations*

The following escalation recommendations are based on the previous analysis of anticipated market activity, labor and material cost movement, productivity expectations and anticipated margin movement.

- Looking at Q4 2014, we expect construction activity growth in most major sectors. Healthcare, education and infrastructure heavy engineering will decline but nonresidential buildings will begin to grow rapidly.
- Residential construction will expand, although at a somewhat slower rate than 2012-2013.
- Nonresidential buildings activity will begin to expand more rapidly.
- In 2015, we can expect construction activity growth in all major sectors.
- In 2015, commercial and office construction are expected to experience very high growth.
- Pent-up demand, particularly in the public sector, for example k-12, may result in a higher rate of activity although this may not show up until later in 2015.
- For both 2015 and 2016, the general consensus of construction economists is growth in spending of 8% to 11%.
- Inflationary pressures may push the rate of material cost increases higher. All material cost increases from the manufacturer through the supplier may be passed along to the owner.
- Labor shortages may be significant resulting in much higher labor retention costs.
- Growing work volume will have the effect of reducing productivity.
- Contractors may increase margins 1% to 2% per year.
- Any assumption of low escalation (3%) requires that market activity does not experience strong growth. All signs indicate otherwise.

**Total Escalation for 2014 = 3.5% to 6.5%**
**Total Escalation for 2015 and 2016 = 4.5% to 8%**
Historical labor and material index growth is 75% in 20 years. That is 3.75% simple index growth per year or 2.85% compounded inflation cost growth for 20 years.

Historical as-sold building cost growth is 89% for 20 years. That is 4.45% simple index growth per year or 3.25% compounded inflation cost growth for the last 20 years.

Historical average spending growth is 7% per year (not including 2008 to 2011 when spending declined 35%).

Since the U.S. Census began keeping construction spending records in 1993, we have reached a rate of spending growth over 10% per year only twice and only three other years have exceeded 9% per year growth.

For nonresidential buildings
- In years when spending growth exceeded 10%, as-sold cost escalation was 9% to 11%.
- We may potentially see escalation similar to the growth years of 2005 through 2007 when (for nonresidential buildings) spending grew 43% and escalation averaged 9% per year for three years. All leading indicators point to continued growth for the next few years.

For each year above, consider your market. If you are in a market area or sector that has expectations of a huge volume of work that may start within a narrow window of time, then market pricing can turn rapidly for you.

FIGURE 25:
Inflation / Escalation Minimum and Potential 2000-2016

Prior to economic expansion and then downturn, long-term escalation averaged 3.5% for 20 years. I do not see any scenario which has us return to escalation as low as that long-term average at least for several years beyond the above noted predictions. Potential inflationary periods, declining productivity and even slight continued margin growth for several years lead me to recommend a minimum long-term escalation beyond 2016 of no less than 4%.
Gilbane Inc. is a full service construction and real estate development company composed of Gilbane Building Company and Gilbane Development Company. The company (www.gilbaneco.com) is one of the nation’s largest construction and program managers providing a full slate of facilities related services for clients in education, healthcare, life sciences, mission critical, corporate, sports and recreation, criminal justice, public and aviation markets. Gilbane has more than 50 offices worldwide with its corporate office located in Providence, Rhode Island.

The information in this report is not specific to any one region. The information is limited to the United States and does not address international economic conditions.

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Along with countless news articles, these sources are used for data in this report:
• American Institute of Architects – www.AIA.org
• American Iron and Steel Institute - Steel.org
• American Recycler - AmericanRecycler.com
• Associated Builders and Contractors - ABC.org
• Associated General Contractors of America - AGC.org
• Bloomberg L.P. Financial News - Bloomberg.com
• Bureau of Labor Statistics - Stats.BLS.gov
• Construction Industry Round Table – CIRT.org
• Data Digest – DataDigest
• Economic Cycle Research Institute - BusinessCycle.com
• Engineering News Record - ENR.com
• Financial Trend Forecaster - Fintrend.com
• FMI Management Consulting - FMINET.com
• IHS Global Insight - IHS.com
• Institute for Supply Management - ISM.ws
• McGraw Hill – Dodge – Construction.com
• Metal Prices – MetalPrices.com
• Producer Price Indexes - BLS.gov
• CMD (formerly Reed Construction Data) - CMDgroup.com
• RS Means - RSmeans.com
• U.S. Census Bureau - Census.gov

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